

# TC-120

 Set using ISO screw

676  
*General Export Model*



## SPECIFICATIONS

<b>Power Requirements:</b>	AC 100, 110 - 120, 220 - 240V (Voltage selector provided in the set) 50/60 Hz, 3W	<b>Inputs:</b> MIC input Impedance, low impedance Maximum Sensitivity, -72 dB (0.2 mV)
DC	Four flashlight batteries "C"×4 Rechargeable battery (BP-16) is available as optional accessory (Built in rechargeable facility)	AUX input Impedance, 100 kΩ Maximum Sensitivity, -22 dB (0.06 V)
<b>Track System:</b>	Two-track mono	REMOTE control jack
<b>Tape:</b>	SONY tape cassette or equivalent	<b>Output:</b> MONITOR output Impedance, 8Ω load or more Output Level, 0.775V (0 dB) with 10 kΩ load
<b>Recording Time:</b>	1.0 hr at 1 7/8 ips (4.8 cm/s) with SONY tape cassette C-60 1.5 hrs at 1 7/8 ips (4.8 cm/s) with SONY tape cassette C-90	<b>Speaker:</b> 2 3/4 × 4" (7 × 10 cm) PM dynamic, 8Ω
<b>Frequency Response:</b>	50 - 10,000 Hz	<b>Semiconductors:</b> 9 transistors and 7 diodes
<b>Signal-to-Noise Ratio:</b>	Better than 46 dB	<b>Dimensions:</b> 9 15/16 (W) × 2 1/2 (H) × 5 13/16 (D) (252×63×147 mm)
<b>Power Output:</b>	1.5W maximum across 8Ω load	<b>Weight:</b> 4 lb 13 oz (2.2 kg) (including batteries)
<b>Recording Bias Frequency:</b>	Approx. 85 kHz	

**SONY®**  
**SERVICE MANUAL**

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**1. GENERAL DESCRIPTION**

The SONY Model TC-120 is a compact cassette-type tape recorder which operates on either household AC or on four "C" size flashlight batteries or the optional accessory rechargeable battery pack, BP-16. Record volume is adjusted to the optimum level by the built-in automatic gain control (AGC) circuit to assure proper recording level without touching the controls. All functions are operated with finger-tip ease by the piano-key mode switches. Portable convenience is provided with the built-in speaker and built-in electret condenser microphone. The TC-120 also features the ANTI-WOW MECHANISM and the End-of-Tape Alarm which provides audible warning when the end of the cassette tape is reached to prevent the possibility of inadvertently missing important material while recording. It operates in any carrying position, providing two-track monophonic high fidelity cassette performance.

**2. TECHNICAL FEATURES****2-1. End-of-Tape Alarm**

The TC-120 is provided with a special sensing circuit which produces an audible alarm through the speaker when the end of the cassette tape is reached during recording. The alarm sounds when the sensing poles are short-circuited by foil strips at the end of the tape producing positive feedback. (The sensing pole is grounded during playback and there is no alarm)

**Note:** The End-of-Tape Alarm operates only when foil equipped cassettes are used, such as the SONY AUTO-SENDER TAPE CASSETTE.

**2-2. Electret Condenser Microphone**

The condenser microphone has long been known for its several desirable characteristics: flat frequency

response, high sensitivity, wide dynamic range, and good transient response along with physical durability and ruggedness.

The need for an external power supply has been one drawback to the condenser microphone. The SONY Electret Condenser microphone retains the desirable qualities of the regular condenser types while eliminating the external power requirement, representing a significant advancement in the production of a simple, low-cost, high performance microphone. The SONY "electret-treated" high-polymer film diaphragm reduces physical size requirements, needs no additional power supply and provides outstanding performance.

**Note:** The "electret-treatment" is based on the fact that certain materials, when placed in a high potential electric field, retain an electric polarization when removed from the field. Extensive research by SONY engineers has developed the electret principle to an advanced state of stability unattainable until now.

Another milestone is the built-in impedance-translator amplifier which uses a Field Effect Transistor (FET) type of monolithic integrated circuit. The combination of the electret-condenser with the IC FET amplifier results in a microphone product representing the most advanced state-of-the-art development. Following is a summary of engineering features made possible by these advances in microphone manufacture:

- (1) High sensitivity for small size (minimum diameter available is as small as 7 mm).
- (2) The light weight of the diaphragm assures higher fidelity.
- (3) Noise from any possible vibration is minimized.
- (4) Use of the IC further minimizes noise (3 microvolts at 20 - 10,000 Hz) and insures greater reliability.
- (5) The dynamic range is very wide (92dB or more).

### 2-3. Anti-Wow Mechanism

Many portable tape recorders suffer from a sensitivity to physical movements during use. When these recorders are rotated in certain directions, the gyroscopic effects on the flywheel produce changes in the tape speed causing severe "wow".

In the SONY Model TC-120, the ingenious use of TWO flywheel (Fig. 2-1) provides superior stability against such rotational sensitivity. The two flywheels are driven by opposite sides of the same belt and thus turn in opposite directions. Rotation of the

recorder causes *equal but opposite* gyroscopic effects on each flywheel and these equal-but-opposite forces neutralize one another. The motor lies in a different plane from that of the flywheels. The entire recorder is therefore amazingly free from "wow" effects of normal handling and movement.

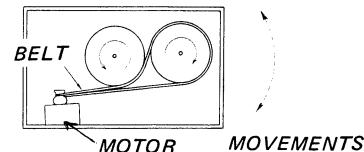
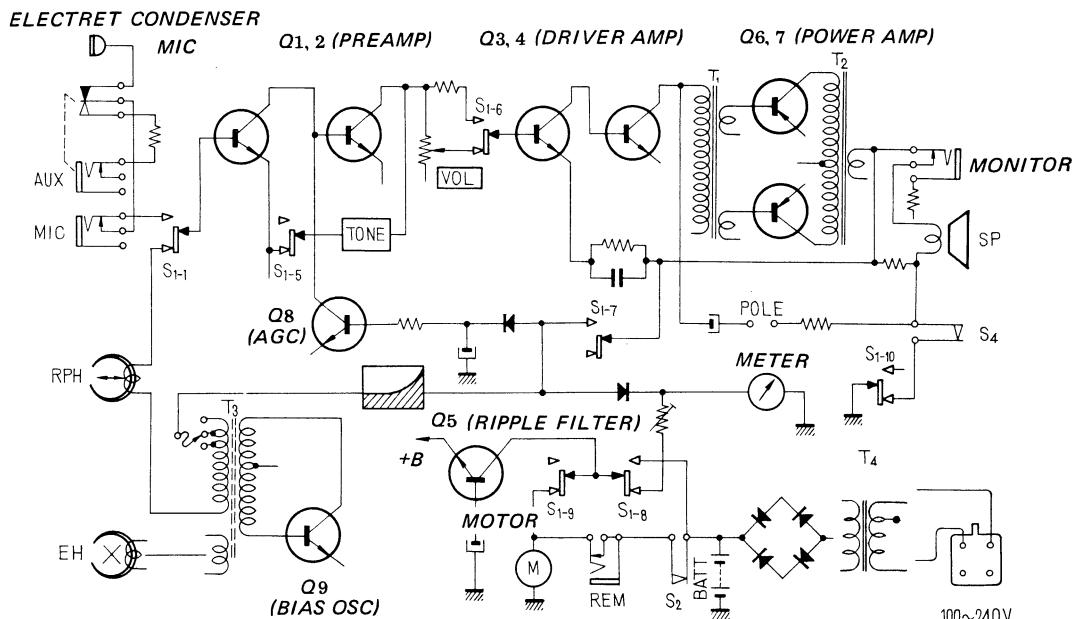
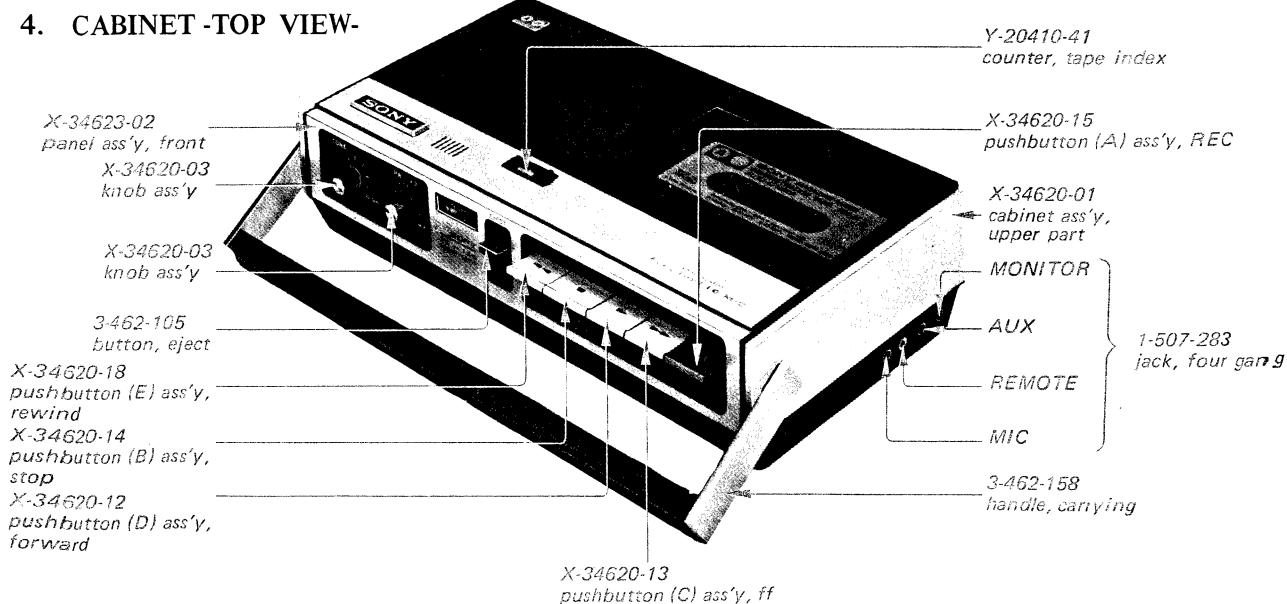


Fig. 2-1

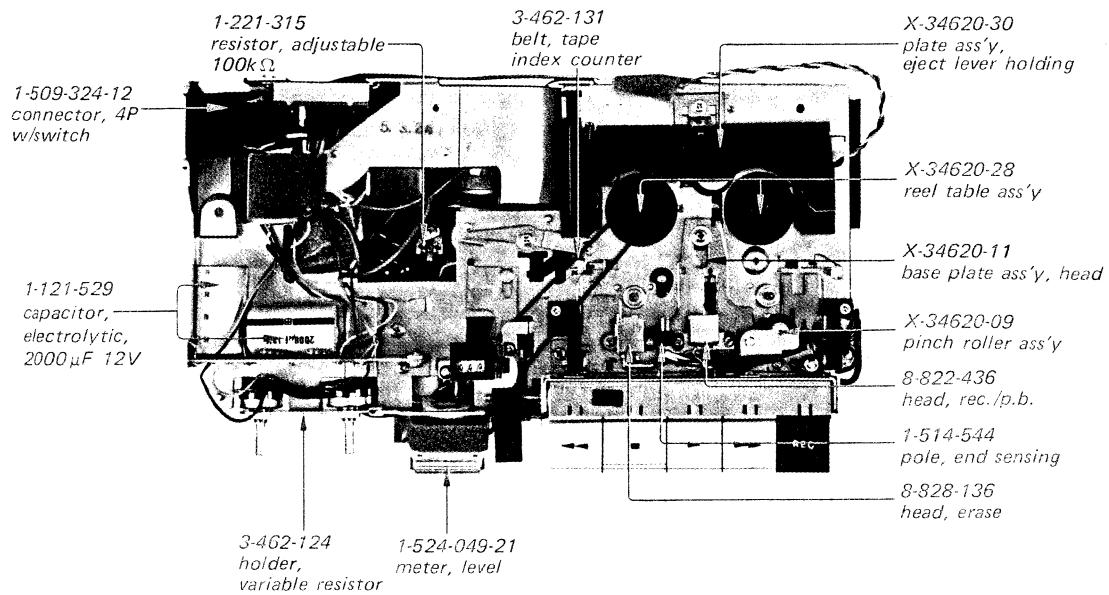
### 3. BLOCK DIAGRAM



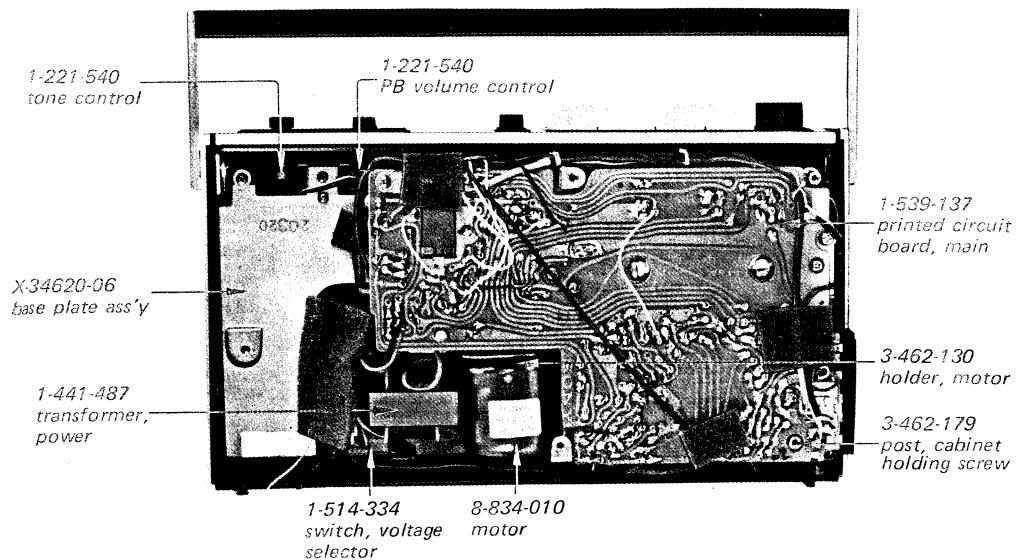
### 4. CABINET -TOP VIEW-



## 5. CHASSIS -TOP VIEW-

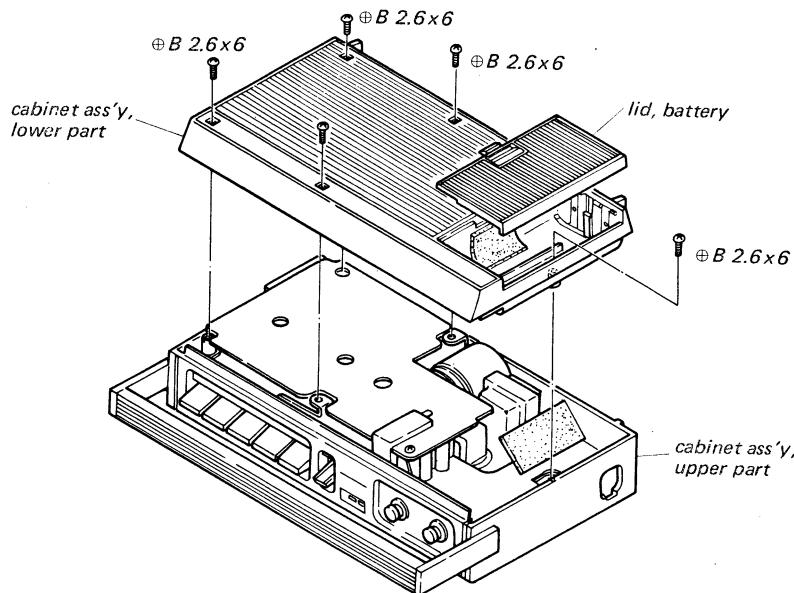


## 6. CHASSIS -BOTTOM VIEW-



## 7. DISASSEMBLY

### 7-1. Lower Cabinet Removal



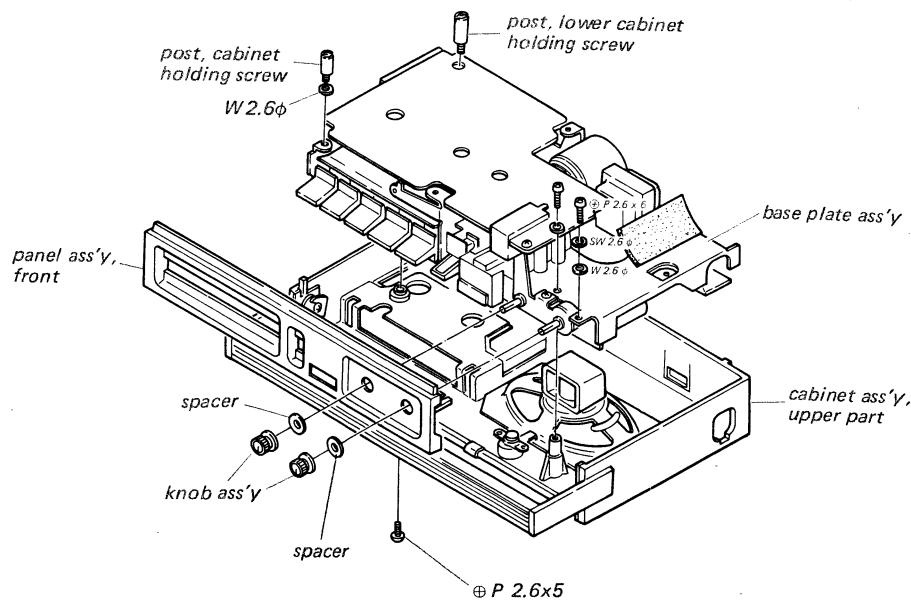
*Fig. 7-1 Lower cabinet removal*

### 7-2. Upper Cabinet Removal

Before removing upper cabinet, unsolder following lead wires on the main circuit board.

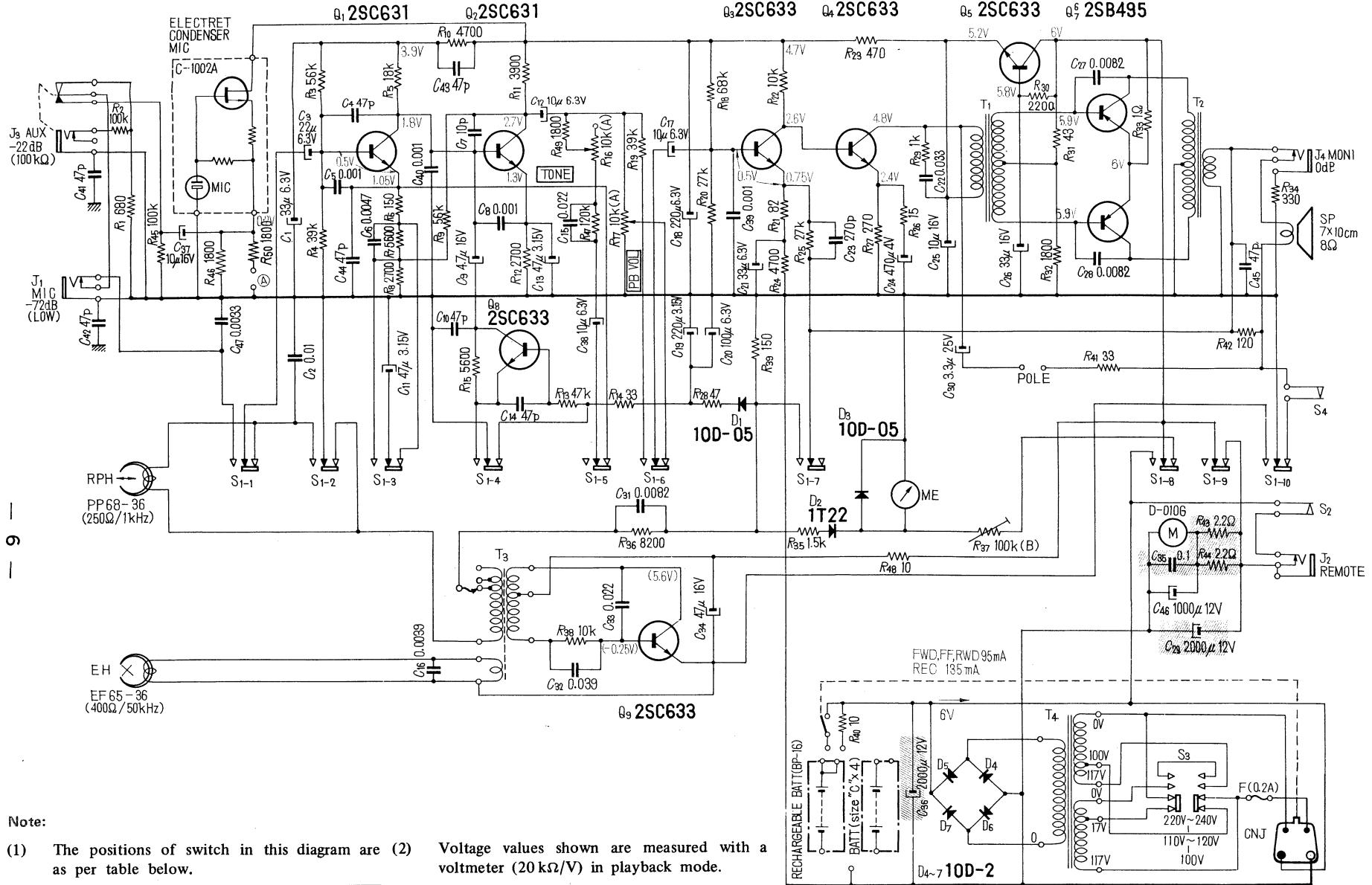
- (1) shielded wire coming from speaker terminals.

- (2) lead wire (black) coming from electret condenser microphone.
- (3) shielded wire coming from electret condenser microphone.



*Fig. 7-2 Upper cabinet removal*

## 8. SCHEMATIC DIAGRAM



Switch No.	Description	Position
S1	REC/PB Switch	playback
S2	Power Switch	ON
S3	Voltage Selector Switch	100V
S4	Muting Switch	ON only in record mode

(3)

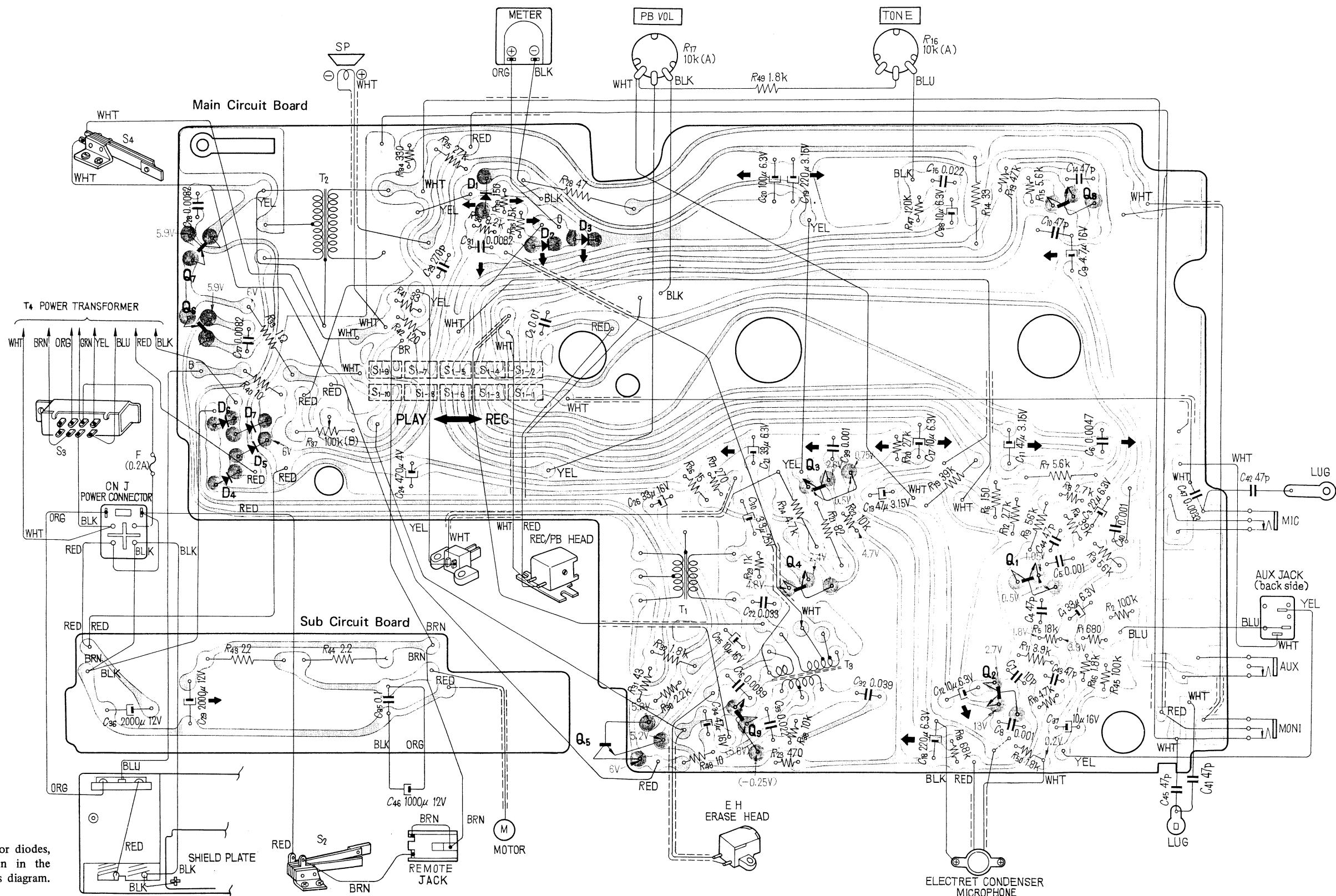
All resistors and capacitors are rated in  $\Omega$  and  $\mu\text{F}$  respectively unless otherwise specified.

- (4) In using electret condenser microphone marked in red paint on side of case, connect between marked with Ⓐ.
- (5) Parts in oblique line are mounted on sub printed circuit board.

# TC-120 TC-120

## 9. MOUNTING DIAGRAM

— Conductor side —



Note:

When replacing capacitors, resistors or diodes, solder after laying the parts down in the direction shown with arrows in this diagram.

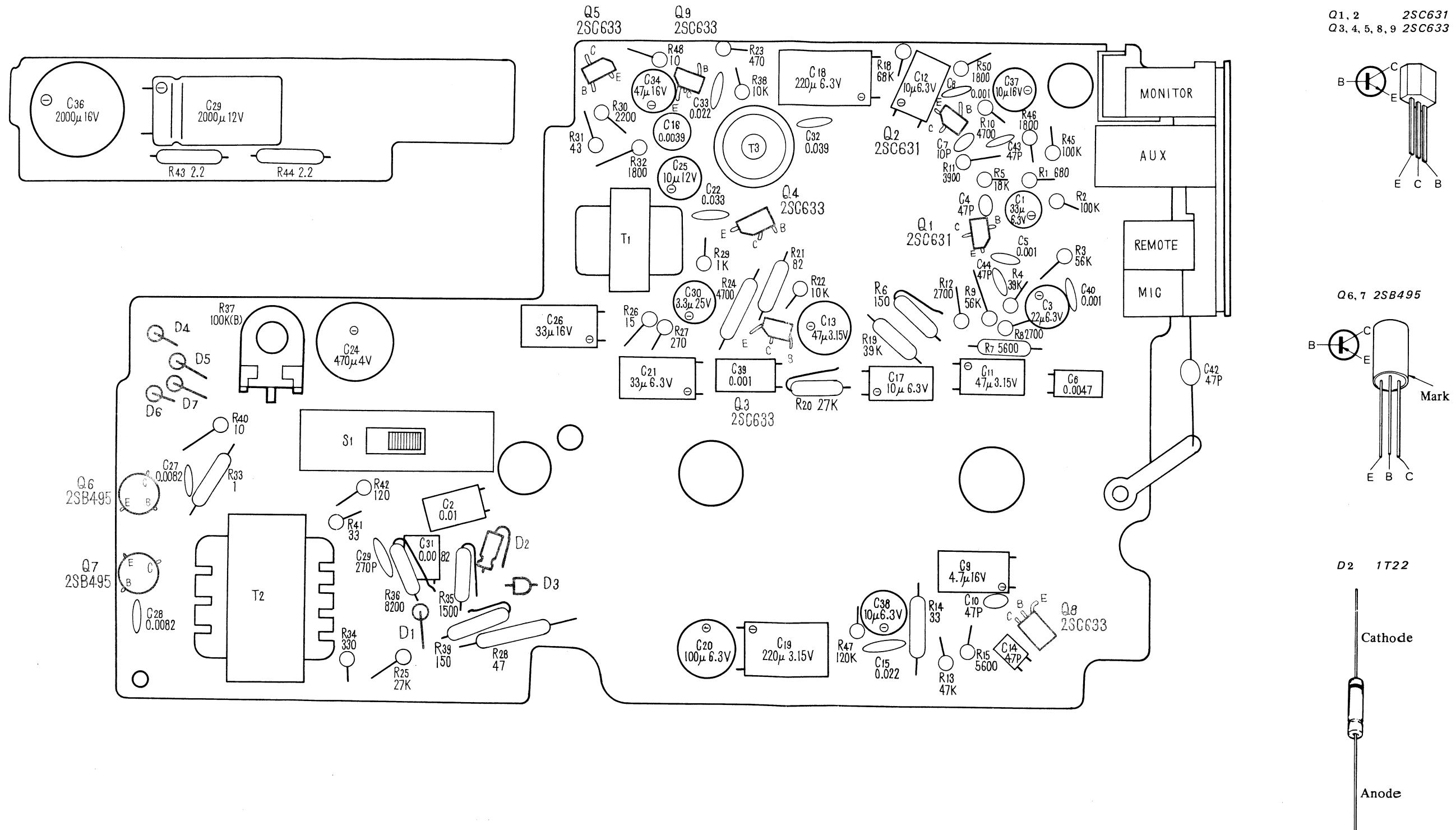
### Printed Circuit Board Part No.

Main Circuit Board: 1-539-137-13  
Sub Circuit Board: 1-539-138-11

# TC-120 TC-120

## 9. MOUNTING DIAGRAM

— Component side —

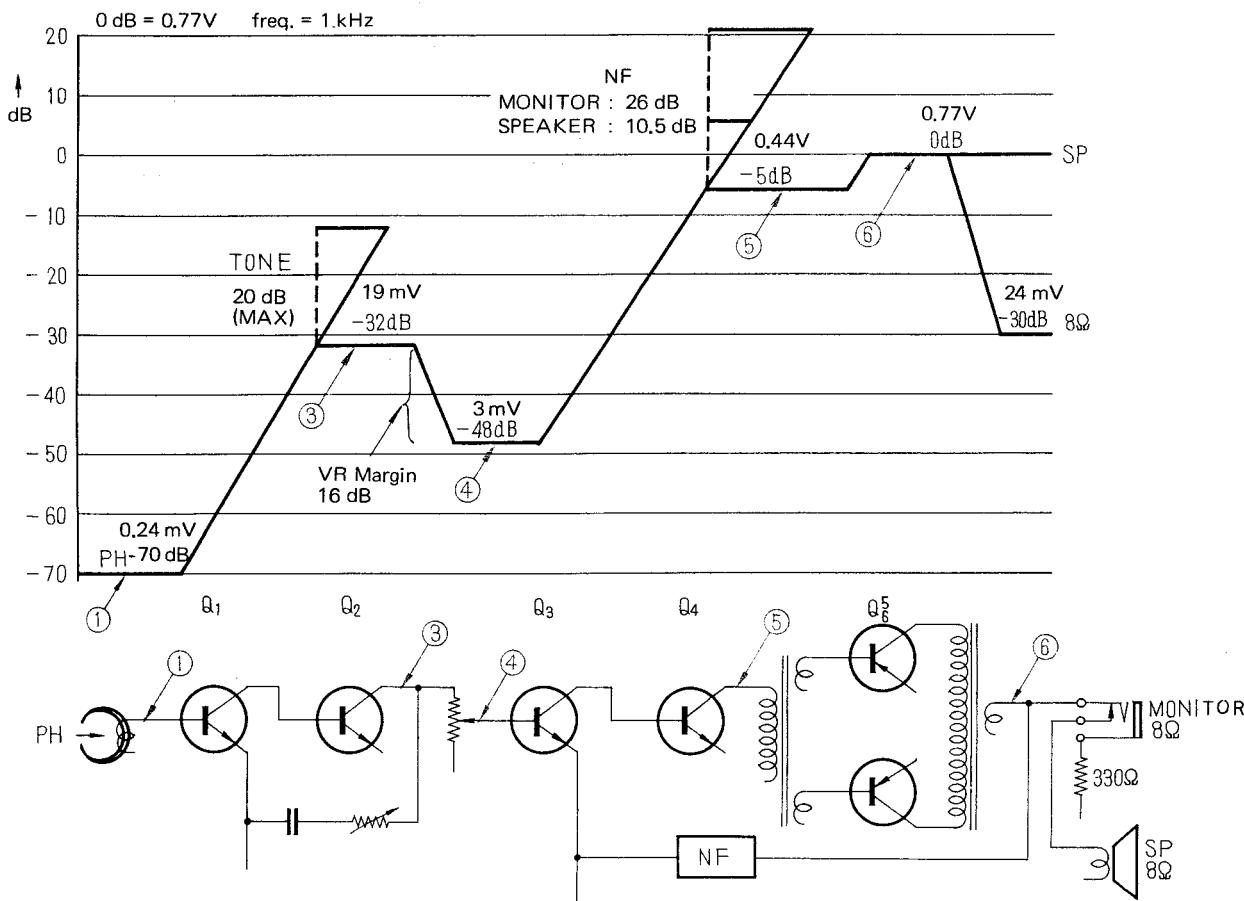


## 10. ELECTRICAL PARTS LIST

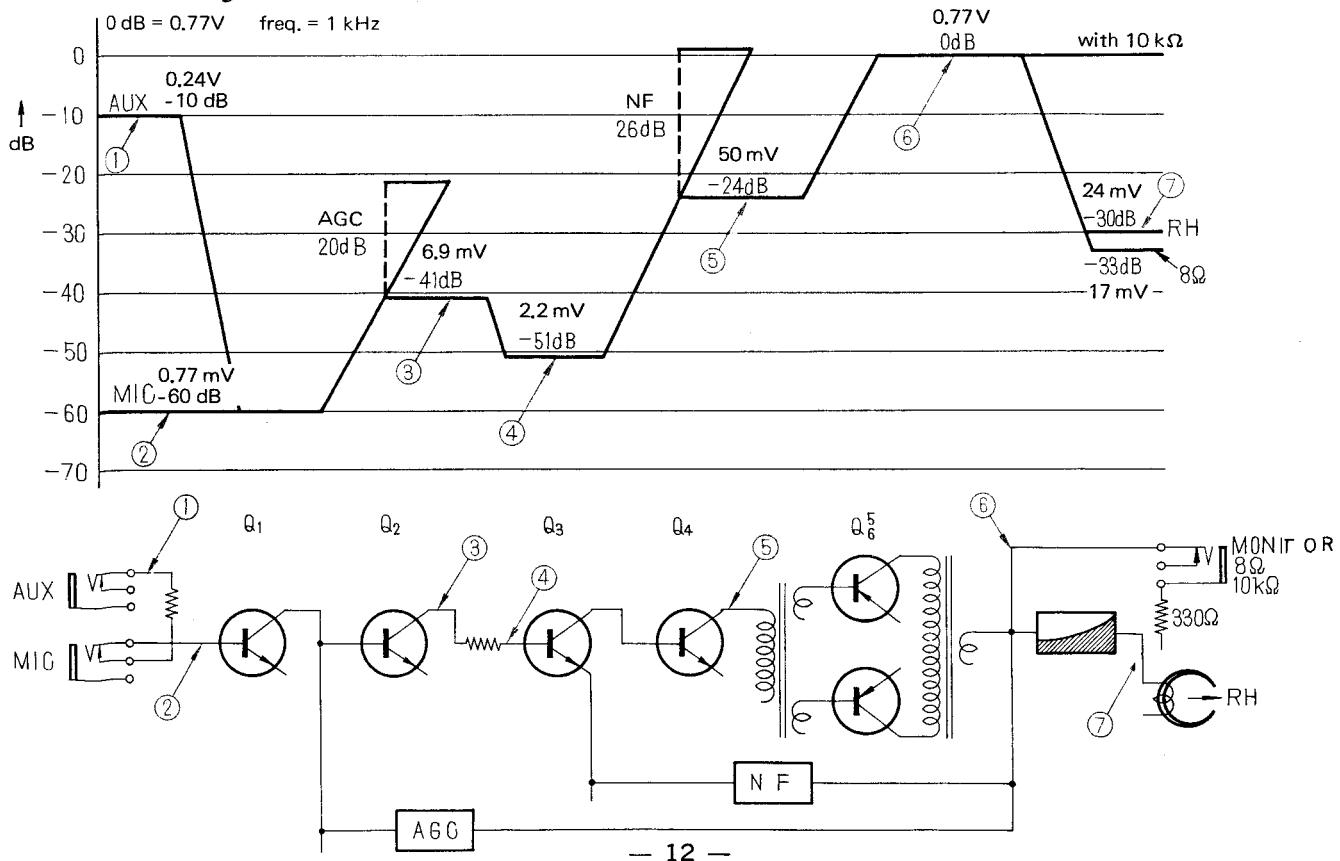
Symbol	Part No.	Description	Symbol	Part No.	Description
Q1		Transistor 2SC631	R31	1-242-640-	Resistor 43Ω 1/4W, carbon
Q2		" 2SC631	R32	-679-	" 1.8kΩ "
Q3		" 2SC633	R33	1-244-601-	" 1Ω "
Q4		" 2SC633	R34	1-242-661-	" 330Ω "
Q5		" 2SC633	R35	-677-	" 1.5kΩ "
Q6		2SB495	R36	-695-	" 8.2kΩ "
Q7		2SB495	R37	1-221-315-	" 100kΩ (B), adjustable
Q8		2SC633	R38	1-242-697-	" 10kΩ 1/4W, carbon
Q9		2SC633	R39	-653-	" 150Ω "
D1		Diode 10D-05	R40	-625-	" 10Ω "
D2		" 1T22	R41	-637-	" 33Ω "
D3		" 10D-05	R42	-651-	" 120Ω "
D4		" 10D-2	R43	1-244-609-	" 2.2Ω "
D5		" 10D-2	R44	-609-	" 2.2Ω "
D6		" 10D-2	R45	1-242-721-	" 100kΩ "
D7		" 10D-2	R46	-679-	" 1.8kΩ "
J1		Jack, mic.	R47	-723-	" 120kΩ "
J2		" , remote	R48	-625-	" 10Ω "
J3	1-507-238-12	" , aux. input 4-gang	R49	1-244-679-	" 1.8kΩ "
J4		" , monitor	R50	1-242-679-	" 1.8kΩ "
S1	1-514-254-11	Switch, rec./p.b.	C1	1-121-284-	Capacitor 33μF 6.3V, electrolytic
S2	-266-11	" , power	C2	1-105-673-12	" 0.01μF, mylar
S3	-334-11	" , voltage selector	C3	1-121-510-	" 22μF 6.3V, electrolytic
S4	-583-11	" , timing	C4	1-107-123-	" 47pF, mica
POLE	-544-12	Pole, end sensing	C5	1-101-918-	" 0.001μF, ceramic
RPH	8-828-436-00	Head, rec./p.b.; PP68-36	C6	1-105-669-11	" 0.0047μF, mylar
EH	8-822-136-00	Head, erase; EF65-36	C7	1-107-107-	" 10pF, mica
MIC	8-814-190-11	Microphone, electret condenser	C8	1-101-918-	" 0.001μF, ceramic
M	8-834-010-01	Motor	C9	1-121-281-	" 4.7μF 16V, electrolytic
T1	1-423-049-11	Transformer, driver	C10	1-107-123-	" 47pF, mica
T2	1-427-252-11	" , output	C11	1-121-287-	" 47μF 3.15V, electrolytic
T3	1-433-132-13	" , bias osc.	C12	-347-	" 10μF 6.3V, "
T4	1-441-487-12	" , power	C13	-287-	" 47μF 3.15V, "
ME	1-524-049-21	Meter, level	C14	1-107-123-	" 47pF, mica
SP	1-502-224-11	Speaker	C15	1-105-677-12	" 0.022μF, mylar
CNJ	1-509-324-12	Connector, 4P; w/switch	C16	1-129-276-	" 0.0039μF, poly thylene
F	1-532-129-11	Fuse, 0.2A	C17	1-121-347-	" 10μF 6.3V, electrolytic
R1	1-242-669-	Resistor 680Ω 1/4W, carbon	C18	-295-	" 220μF 6.3V, "
R2	-721-	" 100kΩ "	C19	-294-	" 220μF 3.15V, "
R3	-715-	" 56kΩ "	C20	-291-	" 100μF 6.3V, "
R4	-711-	" 39kΩ "	C21	-284-	" 33μF 6.3V, "
R5	-703-	" 18kΩ "	C22	1-105-679-12	" 0.033μF, mylar
R6	-653-	" 150Ω "	C23	1-107-141-	" 270pF, mica
R7	1-244-691-	" 5.6kΩ "	C24	1-121-553-	" 470μF 4V, electrolytic
R8	1-242-683-	" 2.7kΩ "	C25	-347-	" 10μF 16V, "
R9	-715-	" 56kΩ "	C26	-350-	" 33μF 16V, "
R10	-689-	" 4.7kΩ "	C27	1-105-672-12	" 0.0082μF, mylar
R11	-687-	" 3.9kΩ "	C28	-672-12	" 0.0082μF, "
R12	-683-	" 2.7kΩ "	C29	1-121-529-	" 2000μF 12V, electrolytic
R13	-713-	" 47kΩ "	C30	-344-	" 3.3μF 25V, "
R14	1-244-637-	" 33Ω "	C31	1-105-672-	" 0.0082μF, mylar
R15	1-242-691-	" 5.6kΩ "	C32	-680-	" 0.039μF, "
R16	1-221-540-	" 10kΩ (A), variable	C33	-677-	" 0.022μF, "
R17	-540-	" 10kΩ (A), "	C34	1-121-353-	" 47μF 16V, electrolytic
R18	1-242-717-	" 68kΩ 1/4W, carbon	C35	1-105-845-12	" 0.1μF, mylar
R19	1-244-711-	" 39kΩ "	C36	1-121-529-	" 2000μF 12V, electrolytic
R20	1-242-707-	" 27kΩ "	C37	-347-	" 10μF 6.3V, "
R21	1-244-647-	" 82Ω "	C38	-347-	" 10μF 6.3V, "
R22	1-242-697-	" 10kΩ "	C39	1-105-821-	" 0.001μF, mylar
R23	-665-	" 470Ω "	C40	1-101-918-	" 0.001μF, ceramic
R24	1-244-689-	" 4.7kΩ "	C41	1-107-123-	" 47pF, mica
R25	1-242-707-	" 27kΩ "	C42	-123-	" 47pF, "
R26	-629-	" 15Ω "	C43	-123-	" 47pF, "
R27	-659-	" 270Ω "	C44	-123-	" 47pF, "
R28	1-244-641-	" 47Ω "	C45	-123-	" 47pF, "
R29	1-242-673-	" 1kΩ "	C46	1-121-530-	" 1000μF 12V, electrolytic
R30	-681-	" 2.2kΩ "	C47	1-105-827-12	" 0.0033μF, mylar

## 11. LEVEL DIAGRAM

### 11-1. Playback



### 11-1. Recording



## 12. ELECTRICAL ADJUSTMENT

Item	Signal Source	Output Connection	Mode	Adjust	Remarks
1. Head Azimuth Adjustment	SONY alignment tape, P-4-A81	VTVM and 8Ω resistor in parallel to MONITOR jack	playback	head azimuth adjusting screw (See Fig. 12-1)	1. Set volume control and tone control knobs clockwise to the full. 2. Adjust to obtain the maximum reading on VTVM.
2. Meter Level Adjustment	no signal	no connection	playback	R37 (See Fig. 12-2)	1. Apply 4.4V to power supply terminals. 2. Adjust R37 so that the pointer of level meter just indicates the boundary between red portion and black portion.

Note: 1. Demagnetize and clean the REC/PB head and the erase head.  
 2. After adjustments, apply lock paint to the adjusted parts.  
 3. The following test equipment is to be provided for the adjustments.  
 SONY alignment tape P-4-A81  
 8Ω resistor  
 VTVM  
 4.4V power supply

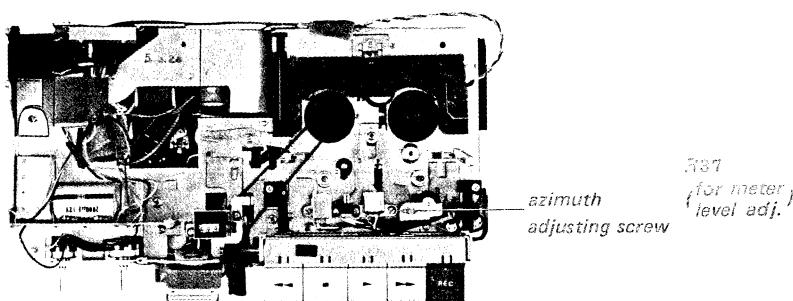


Fig. 12-1 Adjusting position

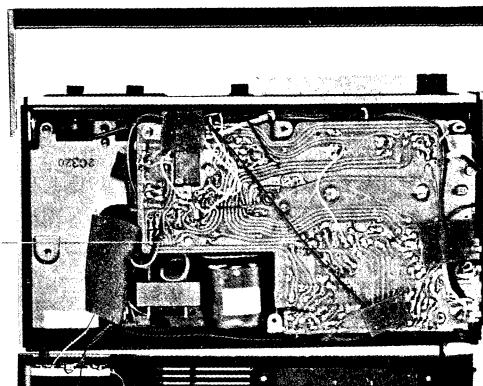


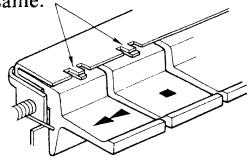
Fig. 12-2 Adjusting position

### — Hardware Nomenclature —

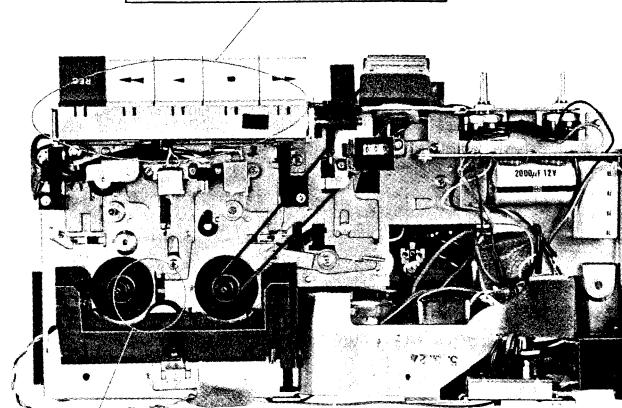
P - Pan Head Screw .....		E - Retaining Ring (E Washer) .....	
K - Flat Countersunk Head Screw .....		W - Washer	
B - Binding Head Screw .....		SW - Spring Washer	
RK - Oval Countersunk Head Screw .....		LW - Lock Washer	
T - Truss Head Screw .....		N - Nut	
R - Round Head Screw .....			
F - Flat Fillister Head Screw .....			
SC - Set Screw .....			
— Example —			
Type of Slit			
⊕ P 3 x 10			
Length in mm (L)			
Diameter in mm (D)			
Type of Head			

## 13. MECHANICAL ADJUSTMENT

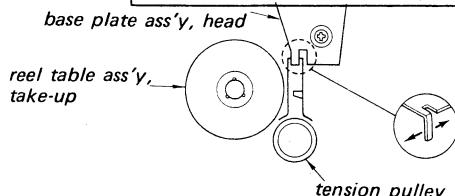
Adjust by bending up or down with a screw driver so that height of all buttons is the same.



Button Height Adjustment

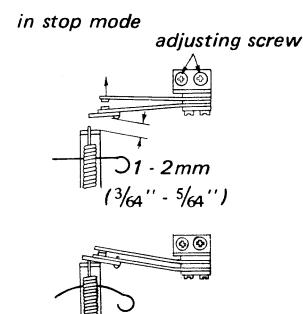
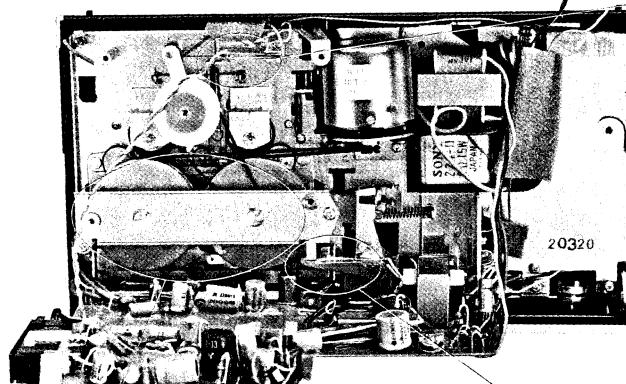


Tension Arm Position Adjustment



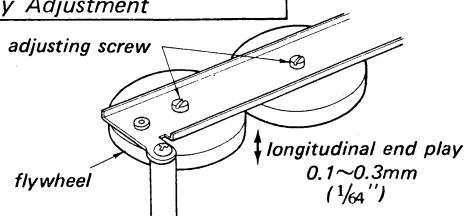
When forward button is pushed gradually, adjust by bending with a pliers so that take-up reel table comes in contact with tension pulley before capstan comes in contact with pinch roller.

Power Switch (S2) Adjustment

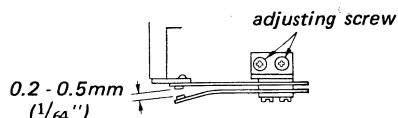


in modes except stop

Flywheel Longitudinal End Play Adjustment



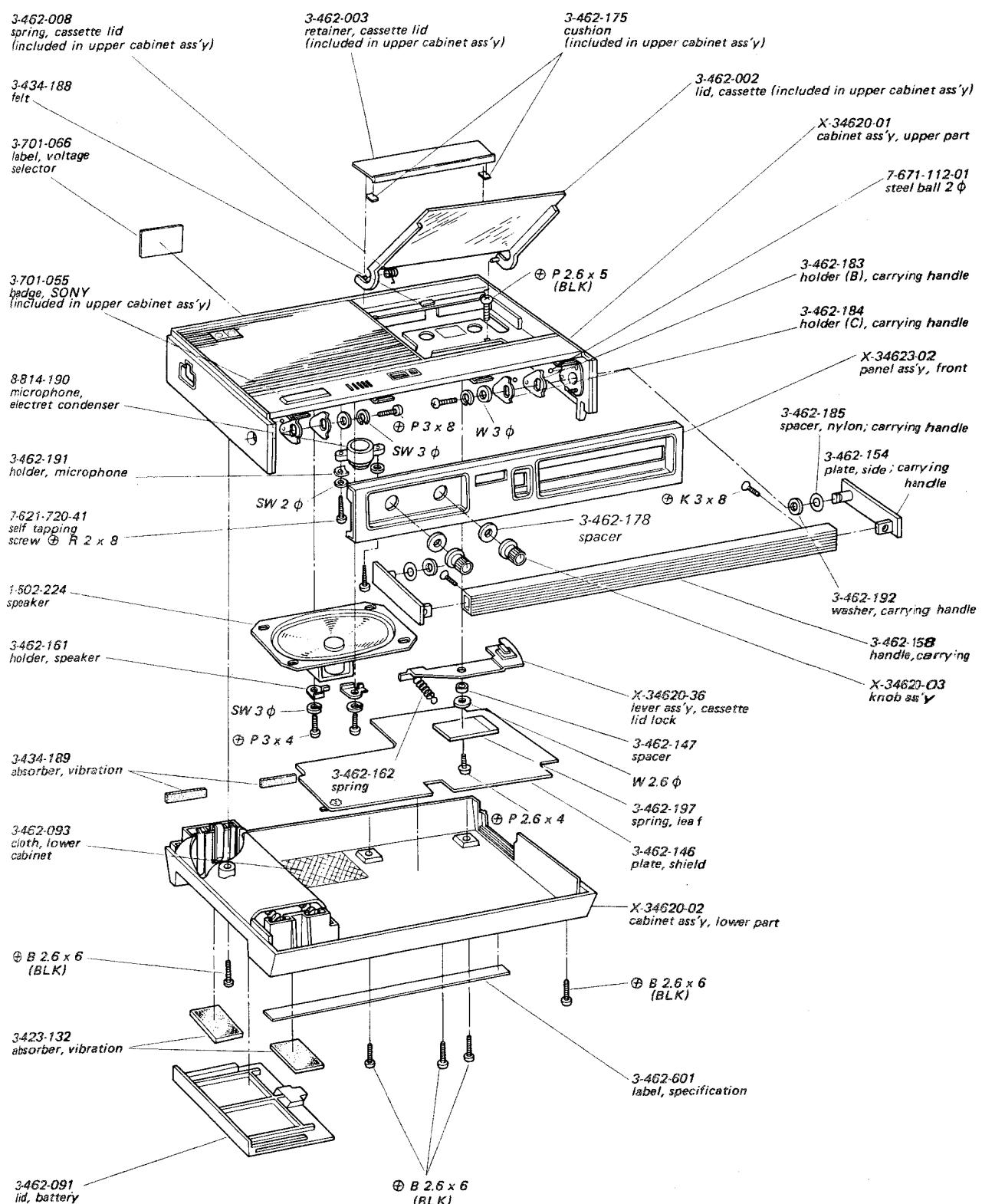
Muting Switch (S4) Adjustment



Under the condition that miserase-preventing lever is not pushed and record button pushed by a finger, loosen the two screws and adjust by positioning the switch.

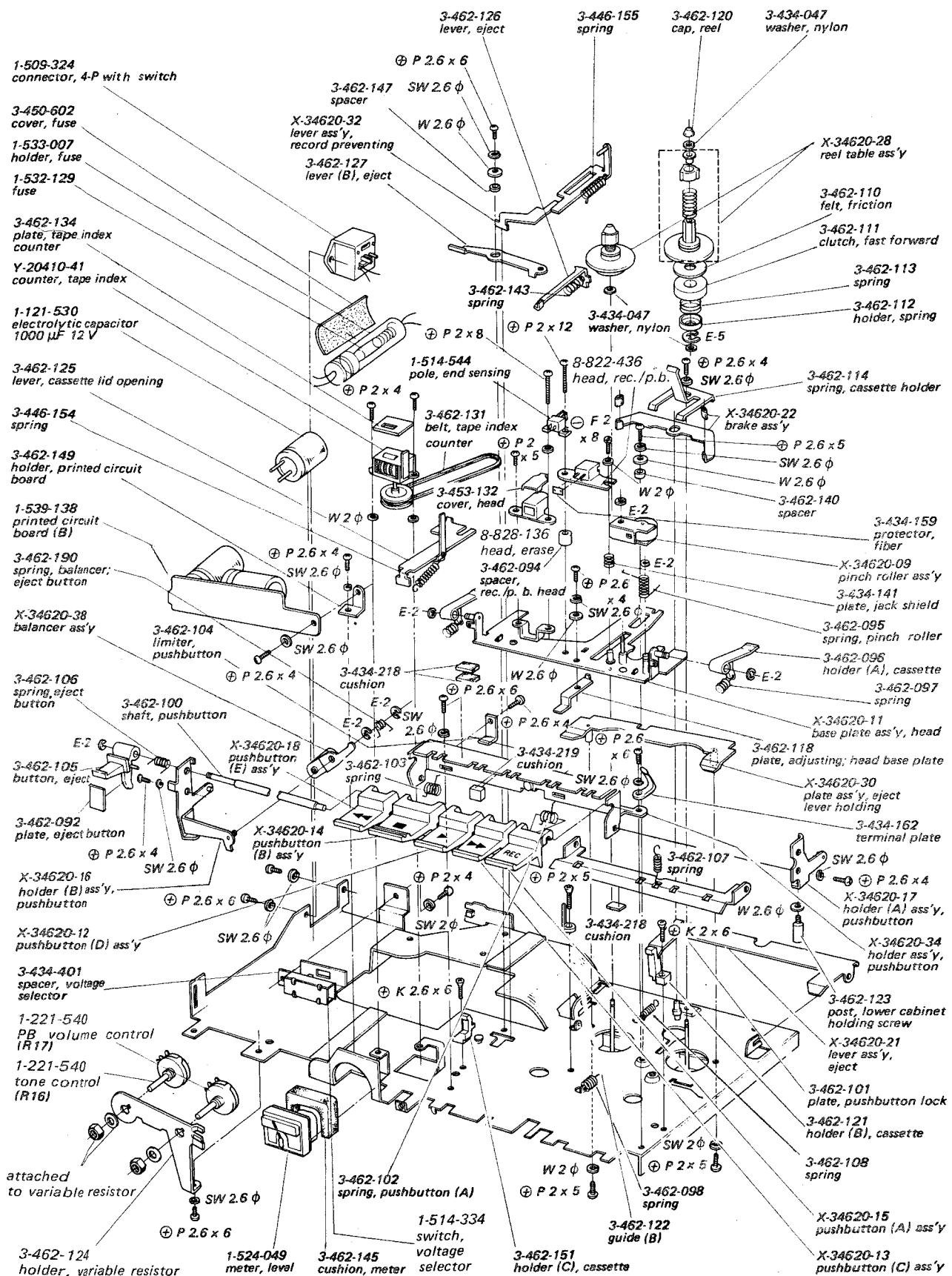
## 14. EXPLODED VIEW

### 14-1. Cabinet -top view-

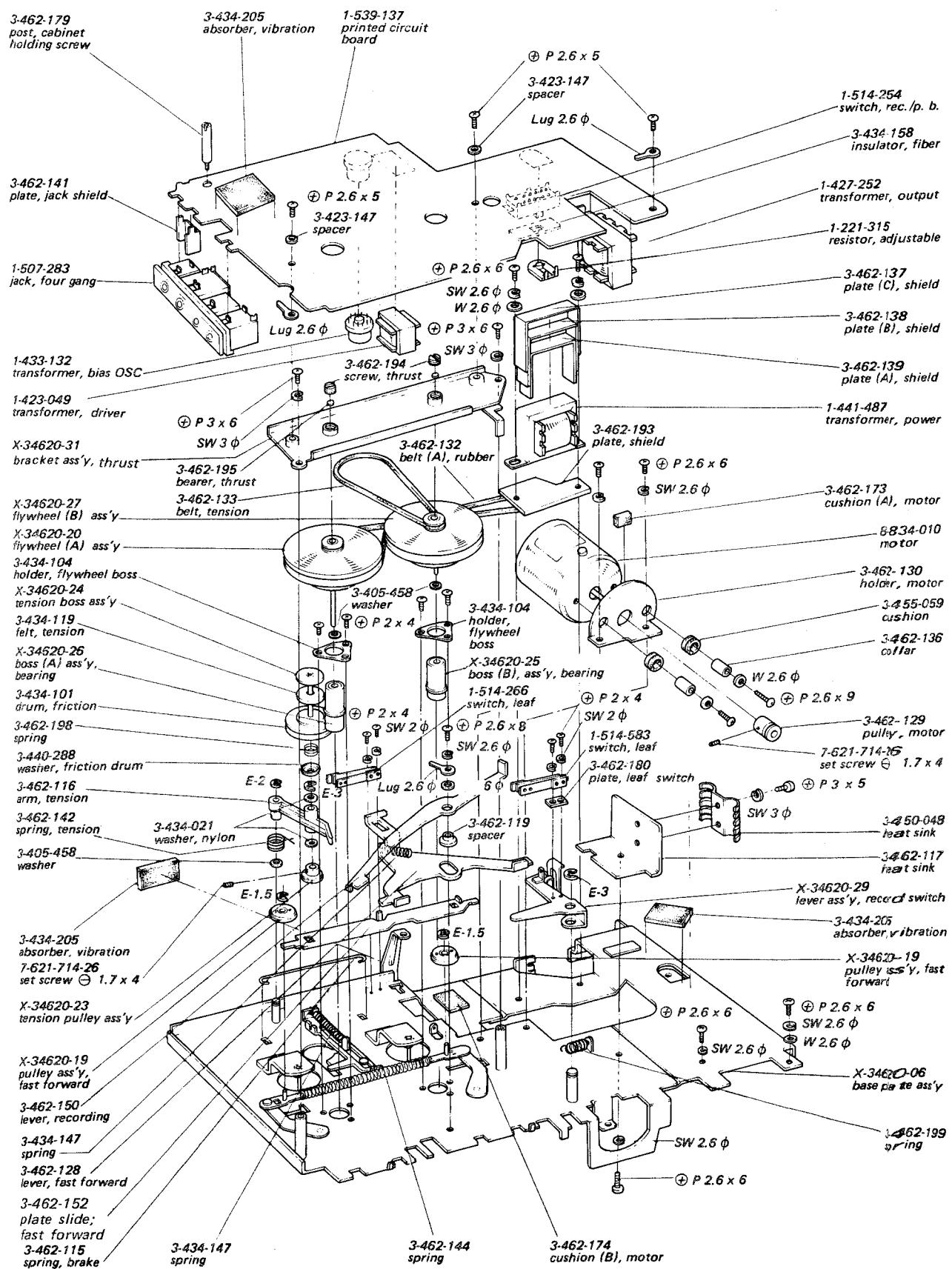


When ordering replacement parts you should use PART NUMBER listed on the Parts List or shown in Exploded Views.  
The symbol number should not be used for ordering purpose.

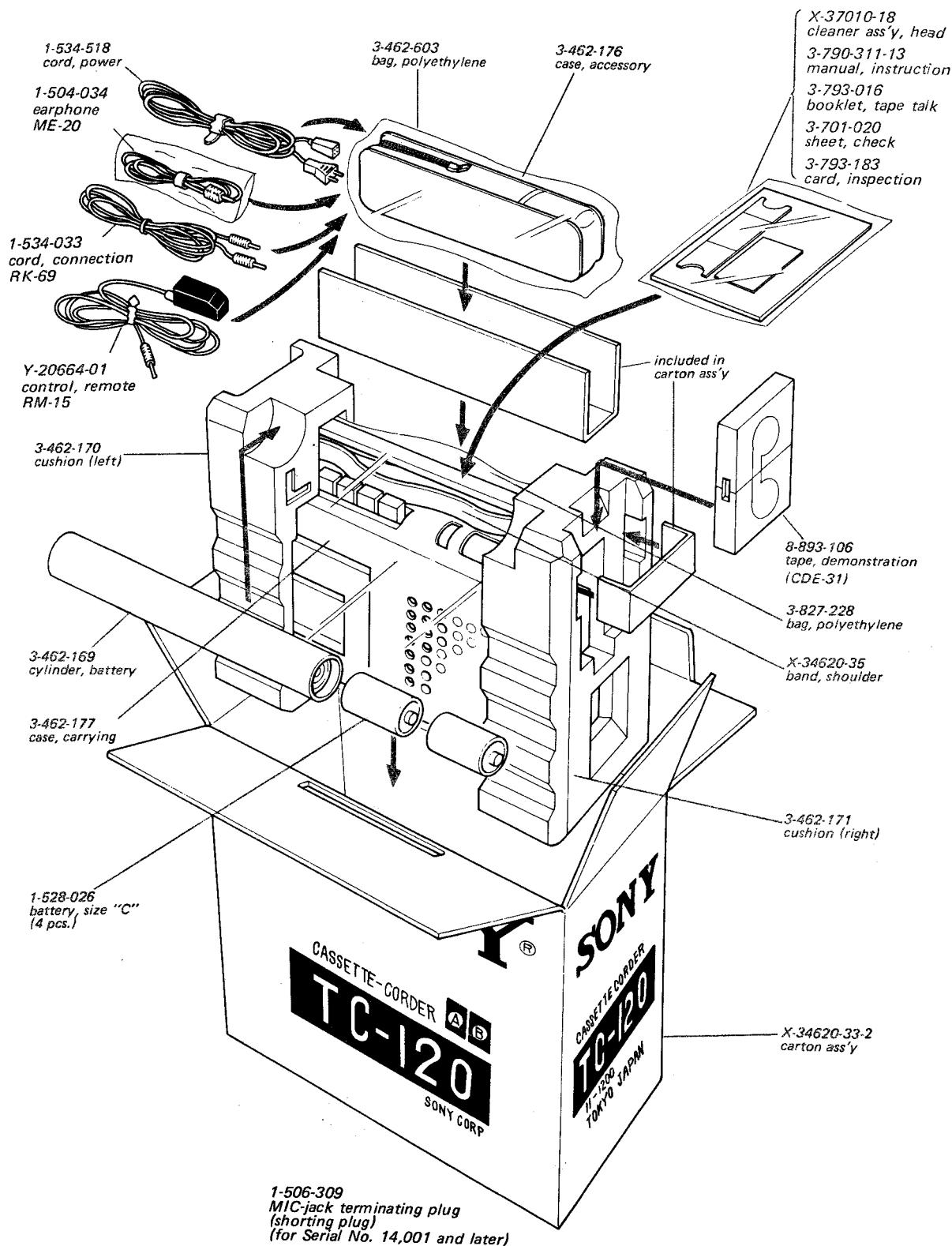
## 14-2. Chassis -top view-



## 14-3. Chassis —bottom view—



## 14-4. Packing



SONY CORPORATION

**SONY®****TC-80/TC-110/TC-120**

# SERVICE MANUAL SUPPLEMENT

No. 1  
JUNE '70

**SUBJECT:** Addition of MIC-jack terminating plug  
**APPLICABLE MODEL:** TC-80, TC-110, TC-120

## Applicable Serial Number

### TC-80

General Export Model: No. 24,001 and later  
USA Model : No. 22,001 and later  
CANADA Model : No. 15,501 and later

### TC-110

General Export Model: No. 26,001 and later  
USA Model : No. 46,001 and later  
CANADA Model : No. 19,001 and later

### TC-120

General Export Model: No. 14,001 and later  
USA Model : No. 19,001 and later

## 1. Description

The MIC-jack terminating plugs is supplied as a standard accessory.

This plug is used for tape-erasing purpose as described below:

When the recorder is placed in erase mode (record mode with no signal input), this plug should be plugged into the MIC jack, so that the built-in electret microphone is turned off and also microphone input circuit is terminated, thereby erasing completely without recording back-ground noise from the built-in microphone.

Accompanying with the addition of the plug, the instruction manual is minor-changed.

### Part added:

<u>Part No.</u>	<u>Description</u>
1-506-309-	MIC-jack terminating plug

### Part changed:

Instruction Manual

<u>Model</u>	<u>New Part No.</u>
TC-80	General Export 3-790-303-13
	USA 3-790-303-13
	CANADA 3-790-303-13
TC-110	General Export 3-790-304-12
	USA 3-790-304-22
	CANADA 3-790-304-42
TC-120	General Export 3-790-311-13
	USA 3-790-311-22

**SONY CORPORATION**